

**ULTRAFAST SAMPLER WITH COAXIAL TRANSITION****Abstract**

An ultrafast sampler includes a series of Schottky diodes configured with a coplanar waveguide to form a nonlinear transmission line (NLTL) that compresses a  
5 local oscillator input to form a series of strobe pulses. Strobe pulses of opposite polarity are capacitively coupled to sampling diodes to obtain samples of a signal applied to a signal input. The samples are directed along an intermediate frequency waveguide to, for example, a signal processor such as an oscilloscope, for storage and analysis. The intermediate frequency waveguide is configured so that conductors of the intermediate  
10 frequency waveguide receive signal samples of a common polarity and strobe samples of opposite polarities so that portions of strobe pulses delivered to a signal processor are distinguished from signal samples. In an embodiment, the intermediate frequency waveguide and the strobe waveguide are symmetrically situated along a common axis, and conductors of the strobe waveguide are positioned between the axis and the  
15 conductors of the intermediate frequency waveguide. The sampling circuit is defined on a GaAs substrate and a coaxial-to-airline-to-substrate transition is configured to deliver signals from a coaxial cable to the sampling circuit. A signal output is configured to direct the signal back into a coaxial cable.

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